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APPARATUS FOR PASSING A FLOW THROUGH HUMAN AND/OR ANIMAL
ORGANS OR EXTREMITIES

Specification:

The invention relates to an apparatus for passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities, having at least one pump device for recirculating the liquids and having at least one mixing unit.

Until now, as an apparatus for passing a mixture of liquids through human and/or animal organs or extremities, a system of hoses and cannulas has been known, in which the mixture of blood and medications is attained via two roller pumps. However, this apparatus cannot be used except by cardiology technicians and is therefore usable only for applications involving cardiac and vascular surgery. Another apparatus of this type is named in European patent disclosure EP 0 855 192 A2, in which blood and medications run into a container from which they are delivered to an infusion cannula. However, this apparatus is very complicated in its overall layout. Moreover, this apparatus does not generate a continuous flow, which can lead to supply problems for the organ or extremity to be perfused.

The object of the invention is to propose an apparatus of the type defined at the outset, which can be used by any physician after only brief instruction and in which continuous perfusion of the organ or extremity is assured.

The invention attains this object with an apparatus for

passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities, having at least one pump device for recirculating the liquids and having at least one mixing unit; the at least one mixing unit has at least two chamber wheels for metered mixing of the liquids.

The desired mixture ratio of the liquids is adjustable via the diameter ratio and/or the chamber size and/or the rotary speed of the chamber wheels. Once the corresponding chamber wheels have been selected, it is assured that the mixture ratio of the liquids is constant. Accordingly the apparatus can be used immediately, after only brief training of those who are to use it. If varying the mixture ratio is desired, then the chamber wheels of the mixing unit can be exchanged for those with the appropriate diameter ratio, or the rotary speed ratio of the chamber wheels can be changed.

Advantageously, the pressure and the volume flow of the liquids can be adjustable.

To assure that the liquids to be mixed will always be mixed at the desired mixture ratio by the two chamber wheels, these wheels can be coupled in terms of their drive.

The chamber wheels can be each supported on two independent shafts and connected by a gear. The gear ratio of the gear then determines the desired mixture ratio, along with the diameter and the chamber size of the wheels. If the gear is a shiftable gear, the mixture ratio can be varied accordingly by a quick manual operation. However, for the sake of coupling them in terms of their drive, the chamber wheels can be disposed on a common shaft.

To make the apparatus compact and easy to handle, the at least one mixing unit and the at least one pump device can be combined in a unit.

Advantageously, the at least one pump can be a
5 centrifugal pump, which in particular recirculates blood substantially more gently than a roller pump, for instance, does.

To prevent fluctuations of pressure or flow, which could possibly interfere with the flow through the organ or
10 the extremity, the at least one pump can preferably be pressure-regulated or flow-regulated.

One exemplary embodiment of an apparatus according to the invention will be described below in further detail, in conjunction with the accompanying drawing.

The sole drawing figure shows a basic sketch of an apparatus 10 for passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities. The apparatus 10 has a pump device 11, with which blood is aspirated from the body via a line 12 and sent on to a mixing unit 14 via a line 13. A container 15 contains a pharmaceutical solution, which is sent on to the mixing unit 14 via a line 16. The mixing unit 14 has two chamber wheels 17 and 18. The two chamber wheels 17 and 18 have different diameters; the ratio of the two
25 diameters determines the mixture ratio of the blood and the pharmaceutical solution. If one wishes to vary the mixture ratio, then the chamber wheels 17 and 18 of the mixing unit 14 can be replaced with other chamber wheels with a suitable diameter ratio. The two chamber wheels 17 and 18 are coupled to one another in terms of their drive via a common shaft 19.
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The shaft 19 thus assures that the mixture ratio remains unchanged. The volume of blood and medication metered by the mixing unit 14 is put together in a branch 20 and thus finally mixed. This mixture is then carried to the organ or
5 extremity through which it is to flow.

It is understood that the two chamber wheels 17 and 18 can also be disposed on separate shafts and coupled via a gear.

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